

## (19) United States

## (12) Patent Application Publication Anckaert et al.

#### (10) Pub. No.: US 2014/0068580 A1 Mar. 6, 2014 (43) **Pub. Date:**

### (54) VISUALIZATION FOR DIVERSIFIED TAMPER RESISTANCE

- (71) Applicant: Microsoft Corporation, Redmond, WA (US)
- (72) Inventors: **Bertrand Anckaert**, Seattle, WA (US); Mariusz H. Jakubowski, Bellevue, WA

(US); Ramarathnam Venkatesan,

Redmond, WA (US)

- (73) Assignee: Microsoft Corporation, Redmond, WA
- (21) Appl. No.: 14/076,685 (22) Filed:

## Related U.S. Application Data

Nov. 11, 2013

(63) Continuation of application No. 11/553,841, filed on Oct. 27, 2006, now Pat. No. 8,584,109.

#### **Publication Classification**

- (51) Int. Cl. G06F 9/455 (2006.01)
- U.S. Cl. CPC ...... *G06F 9/45504* (2013.01)

#### ABSTRACT (57)

A computer-implementable method includes providing an instruction set architecture that comprises features to generate diverse copies of a program, using the instruction set architecture to generate diverse copies of a program and providing a virtual machine for execution of one of the diverse copies of the program. Various exemplary methods, devices, systems, etc., use virtualization for diversifying code and/or virtual machines to thereby enhance software security.

# **VM** IMPLEMENTATION 560

**DIVERSIFICATION OF STACK DATA STRUCTURE** <u>562</u>

DIVERSIFICATION VIA VM **GENERATION** 564

**DIVERSIFICATION VIA AUTOMATIC TECHNIQUES** FOR RANDOM DLLS 566